

NORTH I-25  
EIS



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# SH 119 NEW NB OFF RAMP PACKAGE A

BARBOUR  
STATE PARK

WELD COUNTY

RURAL DITCH

FIRESTONE

USE EXISTING 60' WIDE  
CAR POOL  
LOT

240

FIRESTONE

DRAFT



U.S. Department of Transportation  
Federal Highway  
Administration

October 2, 2007

SH 119

NORTH I-25  
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# SH 119 NEW NB OFF RAMP PACKAGE B

BARBOUR  
STATE PARK

WELD COUNTY

RURAL DITCH

FIRESTONE

CAR POOL  
LOT

FIRESTONE

DRAFT



TOTAL PARKING SHOWN - 450 SPACES  
1 BUS BAY



October 2, 2007

SH 119

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# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

August 20, 2007

## Introduction

This report describes the existing traffic volumes at this interchange and the adjacent intersections, as well as future traffic conditions with an improved interchange.

## Existing Conditions

The interchange of SH 119 with I-25 (milepost 240) was built in 1998 and connects I-25 to south Longmont to the west and to the northern areas of the Town of Firestone to the east. It has a diamond configuration and is one of the newer interchanges in the I-25 corridor. The north oriented interchange ramps are one-lane while the south oriented ramps are two-lane. Each ramp terminal has exclusive left and right-turn lanes and are controlled by traffic signals. At this interchange SH 119 travels under I-25 and consists of two through lanes in each direction, dual eastbound left turn lanes at the northbound ramp terminal and a single left turn lane at the southbound ramp terminal.

The interchange area includes the following roadways:

**SH 119 (Firestone Boulevard).** SH 119 serves as the major point to access for the City of Longmont and therefore is a four-lane facility with a high level of access control, traffic signals at major intersections, and turn lanes at intersections and at access points. The land along SH 119 immediately west of the interchange is relatively undeveloped, although highway-related businesses (i.e. gas stations, fast food, etc.) are located adjacent to the interchange. SH 119 to the east of the interchange, known as Firestone Boulevard, continues as a four-lane facility to the frontage road intersection. East of the frontage road intersection, Firestone Boulevard continues as a two-lane roadway providing access to developing areas of the Town of Firestone. Land along Firestone Boulevard is primarily undeveloped except for commercial uses in the northeast quadrant of the interchange. The speed limit in the vicinity of the interchange is 45 mph.

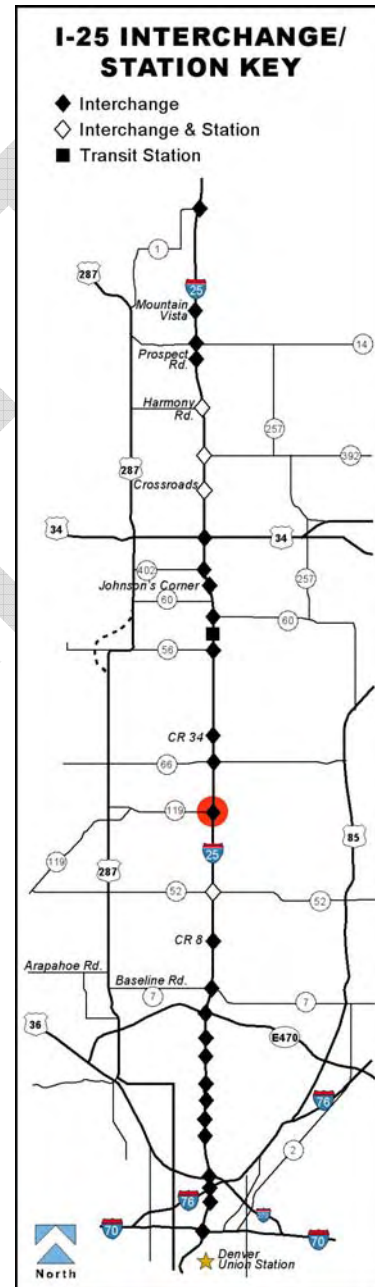


Figure 1. Vicinity Map

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

Page 2 of 19

**East Frontage Road.** The east frontage road provides access to existing businesses and the Southwest Weld County Services building all located north of Firestone Boulevard. To the south the east frontage road provides access to existing carpool lot and commercial uses located along I-25. The frontage road intersects Firestone Boulevard approximately 600 feet from the northbound ramp terminal.

**Turner Boulevard.** Turner Boulevard on the west side of the interchange intersects SH 119 approximately 400 feet west of the southbound ramp terminal. It extends south and provides local access to fast food restaurants, a hotel, a gas station, the truck stop, a mobile home park and other businesses in the area.

Figure 2 shows the existing traffic counts collected in August 2004 at the SH 119 interchange. The counts show that the majority of the traffic at this intersection is oriented to and from the west; average daily traffic is around 37,000 vehicles per day (vpd) west of the interchange and about 25,000 vpd east of the interchange. Daily ramp volumes range between 7,400 and 12,800 vehicles per day, with the higher ramp volumes on the southern oriented ramps. At the interchange, there are several peak hour turn movements over 350 vehicles per hour, all oriented to and from the Longmont area. The highest peak hour volumes occur for the northbound and the southbound to westbound movements at over 650 vehicles in the AM peak. In the PM peak hour, the highest peak hour volume occurs for the eastbound to northbound movement at 525 vehicles per hour. In fact, these are the highest existing peak hour turning movement volumes observed in the I-25 corridor south of US 34.

## Traffic Operations

An operational analysis of the interchange was conducted based on methodology developed in the Highway Capacity Manual (Transportation Research Board, 2000). The result of such analysis is a level of service (LOS) rating. Level of service is a qualitative assessment of the traffic flow based on the average stopped delay per vehicles at intersections by traffic signals and stop-signs.

Levels of service are described by a letter designation ranging from "A" to "F", with LOS A representing essentially uninterrupted flow, and LOS F representing a breakdown of traffic flow with excessive congestion and delay. Signalized intersection analyses result in a level of service rating for each movement and for the entire intersection but typically only the level of service for the entire intersection is reported. For unsignalized intersections a level of service rating is determined for each turn movement that must yield to another turn movement but an overall level of service rating is not determined for the entire intersection. The following table shows how average stopped delay at controlled intersections equates to levels of service.

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

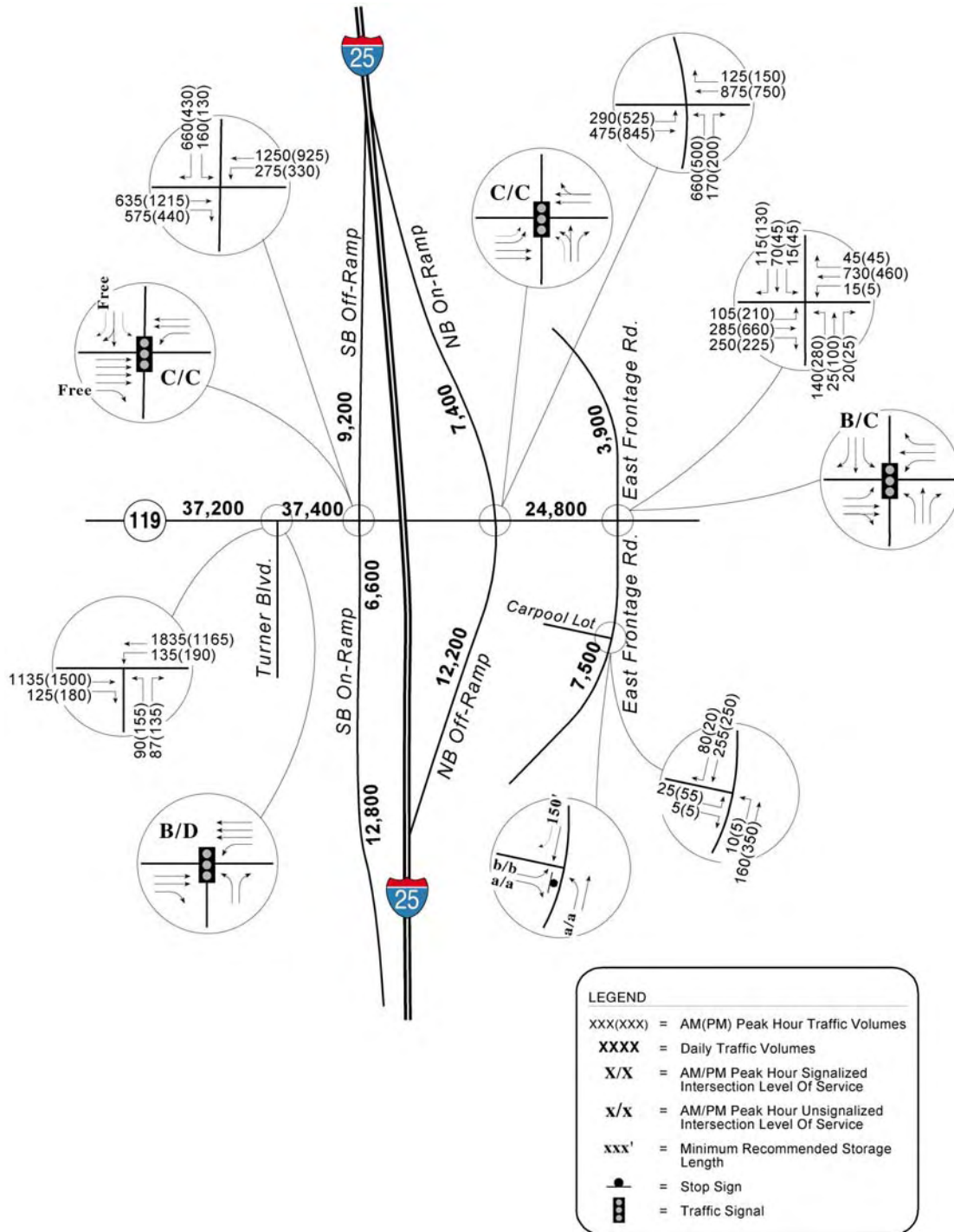
**Table 1. Equivalent Level of Service to Average Stopped Delay**

Level of Service	Average Delay at Signalized Intersections in (sec./veh.)	Average Delay at Stop-Controlled intersections in (sec./veh.)
A	0 to <=10	0 to <=10
B	> 10 to <= 20	> 10 to <= 15
C	> 20 to <= 35	> 15 to <= 25
D	> 35 to <= 55	> 25 to <= 35
E	> 55 to <= 80	> 35 to <= 50
F	> 80	> 50

Figure 2 also illustrates existing peak period levels of service at the ramp terminals and adjacent intersections. Currently, both ramp terminals and the east frontage road intersection operate at LOS C or better during both peak periods, while the Turner Road intersection operates at a LOS D or better during the peak periods.

Table 2 provides additional information for key movements at each intersection and provides further insight into existing operations at the interchange. Key movements are those movements that could have an impact on adjacent intersections or an impact to I-25. For example, east-west movements along SH 119 can queue into adjacent intersections and impede traffic flow at those locations, while vehicles on the ramps could queue back onto the interstate. North-south movements at the west and east frontage road intersections have not been included in the table because they would not impede traffic flow on SH 119 Road. As shown in the table, most of the turn movements currently operate at a LOS D or better. Only the eastbound left-turn movement at the northbound ramp terminal had a level of service worse than LOS D. In most cases, the 95<sup>th</sup> percentile queue lengths were not greater than the distance between intersections or did not exceed the current storage length provided at the interchange.

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation



**Figure 2. Existing Conditions**

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

**Table 2. Existing Level of Service and Queue Lengths for Key Movements**

Intersection / Movement	Level of Service		Estimated 95 <sup>th</sup> Percentile Queue <sup>1</sup>		Intersection Spacing and Storage Length Provisions
	AM	PM	AM	PM	
<b>Turner Boulevard Intersection</b>					
<b>WB Left</b>	B	D	150'	160'	Current Storage Provided – 270'
<b>WB Thru</b>	A	A	230'	140'	Distance to Adjacent Intersection – 350'
<b>Southbound Ramp Terminal</b>					
<b>EB Thru</b>	C	C	190'	300'	Distance to Adjacent Intersection – 350'
<b>EB Right</b>	Free	Free	150'	150'	Continuous accel. / decel. lane
<b>WB Left</b>	C	D	590'	350'	Current Storage Provided – 470'
<b>WB Thru</b>	B	A	460'	140'	Distance to Adjacent Intersection – 530'
<b>SB Left</b>	C	D	200'	170'	Current Storage Provided – 400'
<b>SB Right</b>	D	D	50'	50'	Current Storage Provided – 400'
<b>Northbound Ramp Terminal</b>					
<b>EB Left</b>	D	E	670'	900'	Current Storage Provided – 1340'
<b>EB Thru</b>	C	A	200'	200'	Distance to Adjacent Intersection – 530'
<b>WB Thru/Right</b>	C	C	440'	310'	Distance to Adjacent Intersection – 550'
<b>NB Left</b>	D	D	620'	530'	Current Storage Provided – 1000'
<b>NB Right</b>	A	D	50'	80'	Current Storage Provided – 550'
<b>East Frontage Road Intersection</b>					
<b>EB Left</b>	C	D	120'	360'	Current Storage Provided – 450'
<b>EB Thru/Right</b>	A	B	300'	360'	Distance to Adjacent Intersection – 550'
<sup>1</sup> The queue lengths given in this table primarily come from SimTraffic with some engineering judgment. SimTraffic gives a queue length for each lane. For example, with dual left-turn lanes SimTraffic estimates a queue each lane. In the table, for thru movements the queue length is the longest queue observed in any through lane. For multiple turn lanes (i.e. dual lefts), the queue length is the sum of the queues in each lane. For a single turn lane (i.e. right turn), the queue is just the queue for that lane.					

## 2030 Conditions

2030 traffic projections were developed for the three alternatives being considered:

- 1) No-Action Alternative
- 2) Package A: GPL + CR + CB 85
- 3) Package B: TEL + BRT

These three packages are illustrated in Figures 3 through 5. In developing peak hour turning movements at the ramp terminals and the nearest adjacent intersections, model results were calibrated against existing traffic counts to derive an adjusted model forecast. These adjusted forecasts along with existing turning movement data were used in the NCHRP 255 balancing procedure to develop 2030 peak hour turning movement forecasts. These forecasts were further adjusted, as necessary, to balance between intersections and for reasonableness.

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

**LEGEND**

- ★ Major Structure Rehab by 2030
- Minor Structure Rehab by 2030
- Replace / Rehab Pavement by 2030
- Minor Safety Modifications by 2030
- FasTracks Rail Line

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Figure 3. No Action Alternative



# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

Page 7 of 19

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## LEGEND

	1 New General Purpose Lane (GPL) in Each Direction
	1 New General Purpose Lane (GPL) + Auxiliary Lane in Each Direction
	Commuter Rail (CR)
	Commuter Bus (CB) Service on US 85
	Feeder Bus Service
	Interchange Upgrades
	Number of Lanes
	Commuter Bus Station / Stop
	Commuter Rail Station
	FasTracks Rail Line
	FasTracks / RTD Transit Station
	Potential Commuter Rail Operational & Maintenance Facility
	Potential Commuter Bus Operational & Maintenance Facility

**Congestion Management Measures include:**

- Enhanced carpool lot parking capacity and amenities
- Courtesy patrol (incident management) from SH 14 to SH 7
- Variable messaging signs at all transit stations
- Automated Vehicle Locaters on all transit vehicles - "next bus" technology
- Links to local bike and pedestrian systems at station areas
- Support for development of Transportation Management Organization (TMO)

### NOTE:

- Select sections of I-25 would require auxiliary lanes and / or an additional through lane in addition to this 6-lane cross section.
- Where widening is needed between SH 66 and SH 7, the median would be used.
- Commuter Rail Service without a Longmont to North Metro connection will also be evaluated.



TYPICAL I-25 CROSS SECTION - 6 GENERAL PURPOSE LANES

Figure 4. Package A

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation



### LEGEND

- 1 Buffer-Separated Tolled Express Lane (TEL) in Each Direction
- ■ 2 Barrier-Separated Tolled Express Lanes (TEL) in Each Direction
- Bus Rapid Transit (BRT) Route (Uses TELs on I-25)
- Feeder Bus Service
- ◆ Interchange Upgrades
- ⊗ Number of Lanes: General Purpose/Tolled Express Lanes
- Bus Rapid Transit Station
- FasTracks Rail Line
- FasTracks / RTD Transit Station
- Potential Commuter Bus Operational & Maintenance Facility

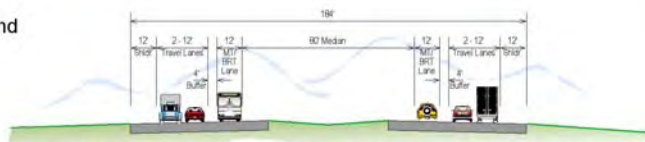
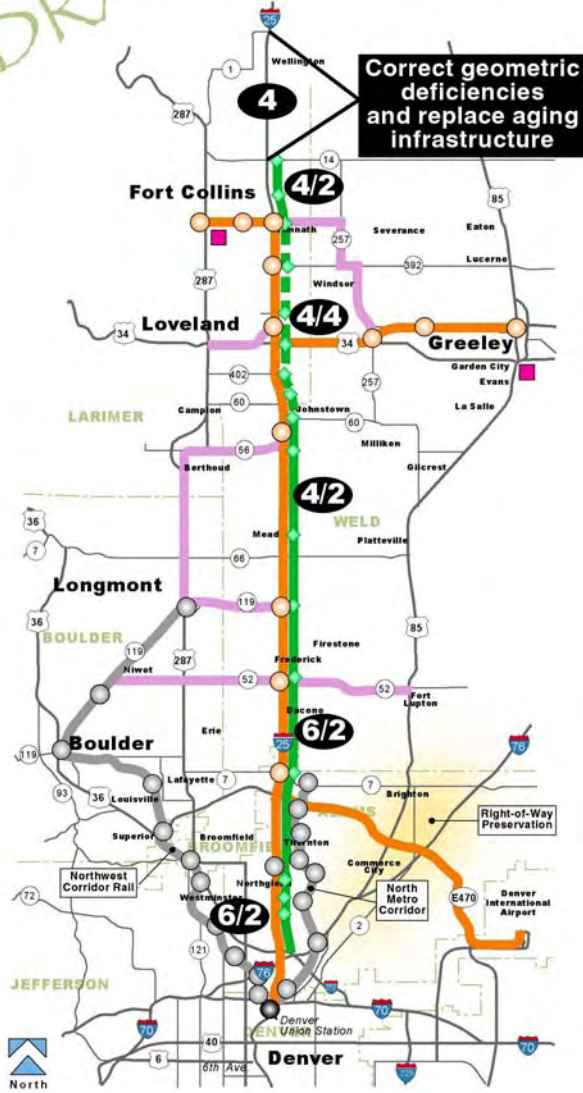
**Congestion Management Measures include:**

- Enhanced carpool lot parking capacity and amenities
- Courtesy patrol (incident management) from SH 14 to SH 7
- Variable messaging signs at all transit stations
- Automated Vehicle Locators on all transit vehicles - "next bus" technology
- Links to local bike and pedestrian systems at station areas
- Support for development of Transportation Management Organization (TMO)

**NOTE:**

- A wider barrier and express lanes cross section is included between SH 60 and Harmony Road.
- BRT stations located within an expanded median area.
- Where widening is needed between SH 66 and SH 7, the median would be used.

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NOT TO SCALE

TYPICAL I-25 CROSS SECTION - BUFFERED SEPARATED TOLLED EXPRESS LANES

Figure 5. Package B

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

Page 9 of 19

## **2030 No Action Traffic Volumes**

Figure 6 depicts 2030 daily and peak hour No Action traffic projections for the SH 119 interchange and adjacent intersections. As shown, daily volume projections on SH 119 range from 36,600 vpd east of the interchange to 77,200 vpd west of the interchange, and ramp volumes range from 12,400 to 24,300 vehicles per day. These volumes show the same patterns as existing counts; the highest traffic flows are westerly to and from Longmont and southerly on the ramps.

## **2030 Package A Traffic Volumes**

Figure 7 depicts 2030 daily and peak hour Package A traffic projections for the SH 119 interchange and adjacent intersections. The volumes in the figure are generally similar to those presented in the No Action Alternative, differing slightly due to the change in capacity on I-25. Daily volume projections on SH 119 range from 39,300 vpd east of the interchange to 83,400 vpd west of the interchange, and ramp volumes range from 13,100 to 26,200 vehicles per day. The traffic patterns are generally the same as existing conditions and No Action conditions; the highest traffic flow is westerly to and from Longmont and southerly on the ramps.

## **2030 Package B Traffic Volumes**

Figure 8 depicts 2030 daily and peak hour Package B traffic projections for the SH 119 interchange and adjacent intersections. The volumes in the figure are generally similar to those presented in the No Action Alternative and in Package A, differing slightly due to the change in capacity on I-25. Daily volume projections on SH 119 range from 38,500 vpd east of the interchange to 81,000 vpd west of the interchange, and ramp volumes range from 12,400 to 26,800 vehicles per day. While the traffic patterns in Package B are generally similar to both No Action and Package A (the highest flows are to and from the west and south), the flow to and from the south in this alternative is higher than in either of the other alternatives.

The traffic forecasts for SH 119 west of the interchange are significantly higher than the generally accepted capacity of a six lane major arterial (48,000 vpd) under the No Action Alternative and in Packages A and B, but have been used in the analysis here to present a conservative analysis, ensuring that the turn lane designs at the interchange would accommodate higher traffic volumes. This was done because there are enough examples of other arterial roadways in Colorado carrying significantly more traffic than their generally accepted capacity (Table 3) to suggest it would be prudent to design for the higher forecasts.

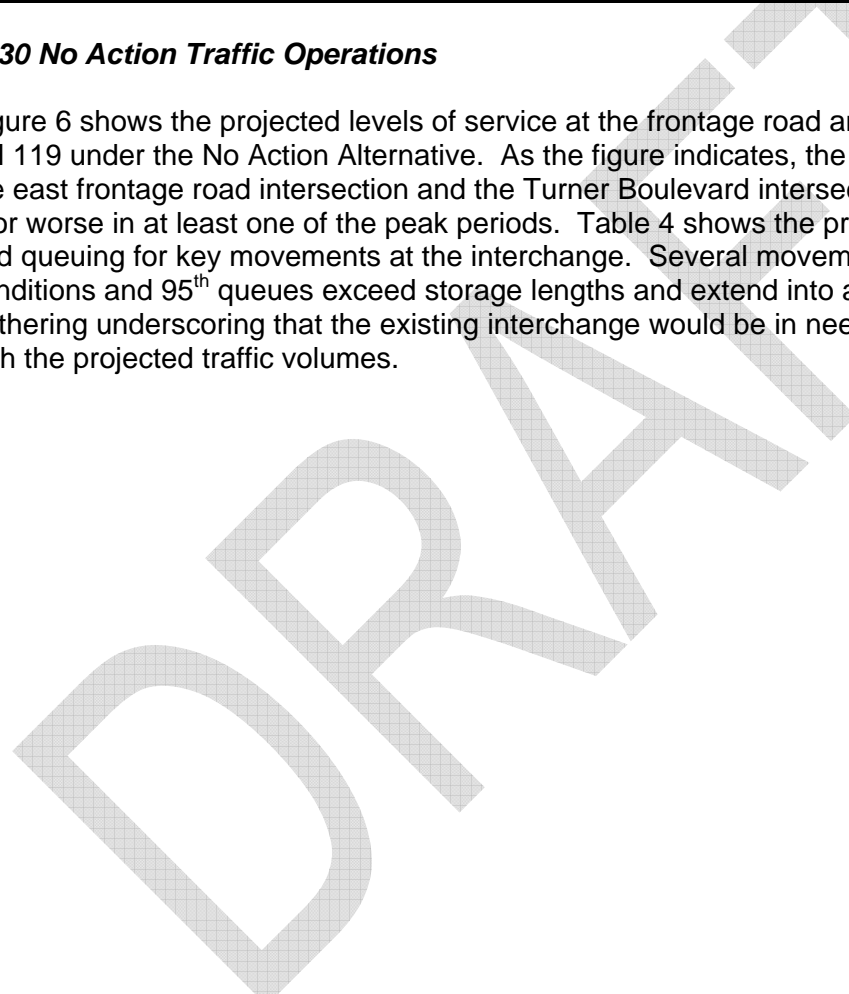
# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

**Table 3. Arterial Roadways where Current Actual Traffic Volumes Significantly Exceed the Generally Accepted Roadway Capacity**

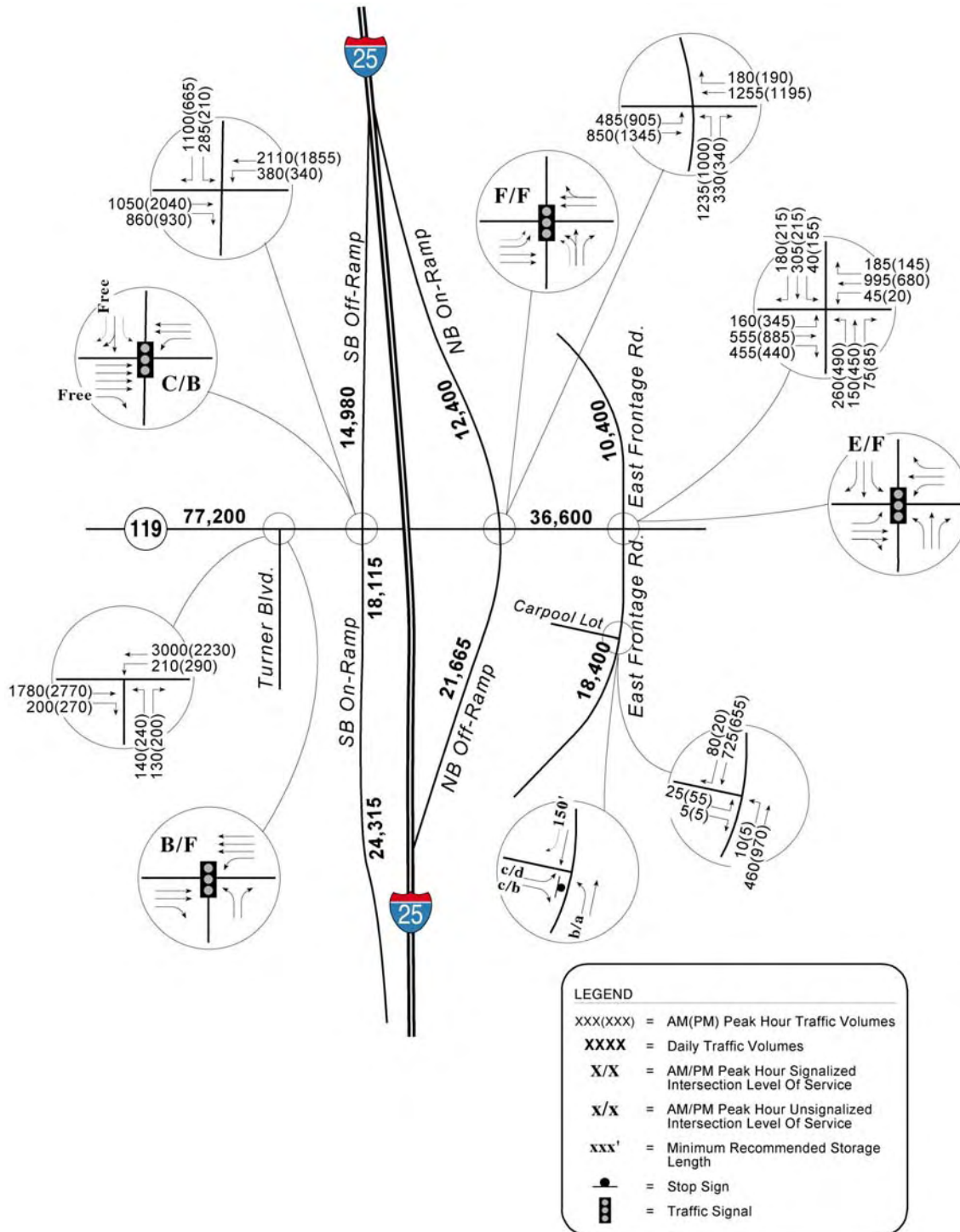
Facility	Location	Roadway Type	Capacity	Actual Volume
Colorado	at I-25	6-lane Major	48,000 vpd	70,000 vpd
Wadsworth	n/o I-70	6-lane Major	48,000 vpd	62,500 vpd
Federal	s/o 6 <sup>th</sup> Avenue	5-lane Major	40,000 vpd	51,200 vpd
Hampden	w/o I-25	4-lane Major	32,000 vpd	53,400 vpd
US 287	at US 36	4-lane Major	32,000 vpd	51,300 vpd
Sheridan	s/o 6 <sup>th</sup> Avenue	4-lane Major	32,000 vpd	45,100 vpd

### **2030 No Action Traffic Operations**

Figure 6 shows the projected levels of service at the frontage road and ramp intersections on SH 119 under the No Action Alternative. As the figure indicates, the northbound ramp terminal, the east frontage road intersection and the Turner Boulevard intersection would operate at LOS E or worse in at least one of the peak periods. Table 4 shows the projected levels of service and queuing for key movements at the interchange. Several movements experience LOS F conditions and 95<sup>th</sup> queues exceed storage lengths and extend into adjacent intersections furthering underscoring that the existing interchange would be in need of capacity improvements with the projected traffic volumes.



# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation



**Figure 6. No Action Forecasts and Levels of Service**

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

**Table 4. 2030 No Action Level of Service and Queue Lengths for Key Movements**

Intersection / Movement	Level of Service		Estimated 95 <sup>th</sup> Percentile Queue <sup>1</sup>		Intersection Spacing and Storage Length Provisions
	AM	PM	AM	PM	
<b>Turner Boulevard Intersection</b>					
WB Left	B	F	160'	320'	Current Storage Provided – 270'
WB Thru	A	A	140'	480'	Distance to Adjacent Intersection – 350'
<b>Southbound Ramp Terminal</b>					
EB Thru	A	B	170'	230'	Distance to Adjacent Intersection – 350'
EB Right	Free	Free	80'	120'	Continuous accel. / decel. lane
WB Left	D	D	200'	360'	Current Storage Provided – 470'
WB Thru	C	A	110'	610'	Distance to Adjacent Intersection – 530'
SB Left	F	E	480'	510'	Current Storage Provided – 400'
SB Right	Free	Free	N/A	N/A	Current Storage Provided – 400'
<b>Northbound Ramp Terminal</b>					
EB Left	F	F	1060'	1130'	Current Storage Provided – 1340'
EB Thru	B	B	310'	250'	Distance to Adjacent Intersection – 530'
WB Thru/Right	F	F	480'	440'	Distance to Adjacent Intersection – 550'
NB Left	F	F	1,510'	1,380'	Current Storage Provided – 1000'
NB Right	C	D	560'	630'	Current Storage Provided – 550'
<b>East Frontage Road Intersection</b>					
EB Left	F	F	440'	440'	Current Storage Provided – 450'
EB Thru/Right	A	B	550'	400'	Distance to Adjacent Intersection – 550'
<sup>1</sup> The queue lengths given in this table primarily come from SimTraffic with some engineering judgment. SimTraffic gives a queue length for each lane. For example, with dual left-turn lanes SimTraffic estimates a queue each lane. In the table, for thru movements the queue length is the longest queue observed in any through lane. For multiple turn lanes (i.e. dual lefts), the queue length is the sum of the queues in each lane. For a single turn lane (i.e. right turn), the queue is just the queue for that lane.					

## 2030 Package A Traffic Operations

### Interchange Configuration

The proposed configuration for the SH 119 DEIS interchange evaluation is a diamond configuration (Figure 7). This diamond configuration maintains the current terminal spacing but has several lane enhancements over the existing interchange. Specifically, these include:

- Southbound ramp terminal - Additional westbound and southbound left-turn lanes.
- Northbound ramp terminal – A westbound right-turn lane, a third westbound through lane for westbound left-turn movements at the southbound ramp terminal and additional storage for the northbound movements on the off-ramp.
- East frontage road intersection – A second westbound through lane, an eastbound right-turn lane continuous to the northbound ramp terminal and northbound dual left-turn lanes.

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

Page 13 of 19

- Turner Boulevard intersection – A reconfiguration of the eastbound right-turn lane into an eastbound shared through/right-turn lane.

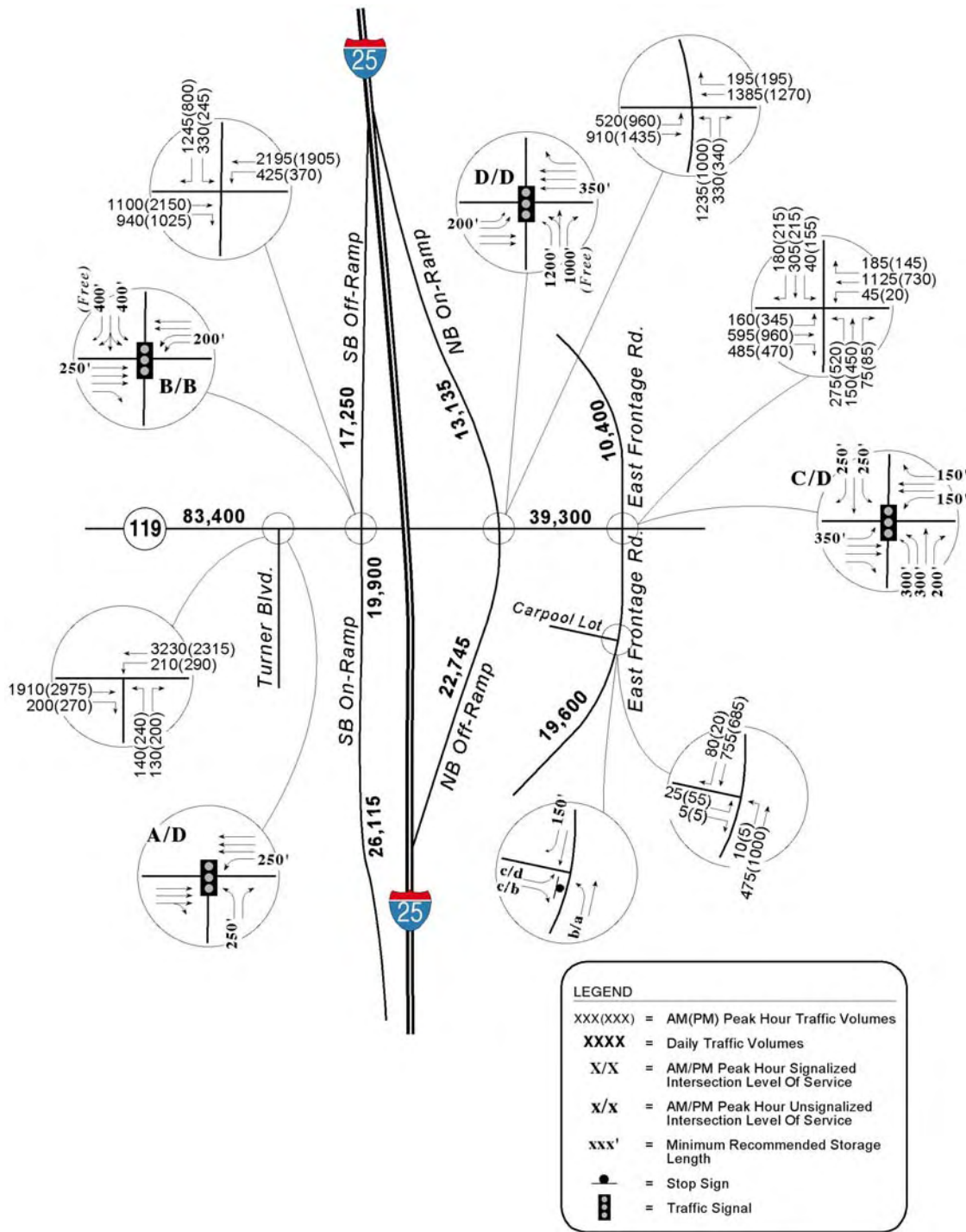
## **Interchange Operations**

Figure 7 also shows the levels of service for the ramps and frontage road intersections, along with recommendations for laneage at each location. As shown, the southbound ramp terminal would operate at LOS B during the peak hours while all other intersections would experience LOS D conditions in at least one of the peak hours. Turn movements from the carpool lot would operate at LOS D or better during the peak hours with stop-sign control. Given the relatively low volumes turning from the car pool lot access and the good levels of service it is recommended to maintain the stop-sign control.

Table 5 summarizes levels of service for key individual turning movements at all intersections. As shown, most movements operate LOS D or better conditions in the peak hours. The left-turn movements from both off-ramps operate at LOS E and the westbound left-turn movement at the Turner Blvd. intersection operates at LOS E.

Table 5 also compares SimTraffic estimates of the 95<sup>th</sup> percentile queue length for those key movements to the storage distance available for each. For turning movements, the distance listed is the planned turn lane storage length, while for through movements the length listed is the distance between intersections. The queuing analysis shows that in both peak hours the estimated 95<sup>th</sup> percentile queues would be contained within the turn bays or within the space between adjacent intersections.

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation



**Figure 7. Package A Forecasts and Levels of Service**



# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

**Table 5. 2030 Package A Level of Service and Queue Lengths for Key Movements**

Intersection / Movement	Level of Service		Estimated 95 <sup>th</sup> Percentile Queue <sup>1</sup>		Intersection Spacing and Storage Length Provisions
	AM	PM	AM	PM	
<b>Turner Boulevard Intersection</b>					
WB Left	D	E	150'	230'	Storage Provided in Design – 250'
WB Thru	A	A	160'	240'	Distance to Adjacent Intersection – 350'
<b>Southbound Ramp Terminal</b>					
EB Thru	B	A	220'	230'	Distance to Adjacent Intersection – 350'
EB Right	B	A	170'	170'	Continuous accel. / decel. lane
WB Left	D	D	680'	610'	Storage Provided in Design – 1070'
WB Thru	A	B	130'	460'	Distance to Adjacent Intersection – 530'
SB Left	E	E	590'	390'	Storage Provided in Design– 800'
SB Right	Free	Free	N/A	N/A	Current Storage Provided – 400'
<b>Northbound Ramp Terminal</b>					
EB Left	E	D	730'	900'	Storage Provided in Design– 920'
EB Thru	B	A	260'	190'	Distance to Adjacent Intersection – 530'
WB Thru	C	D	530'	340'	Distance to Adjacent Intersection – 550'
WB Right	B	D	0'	50'	Continuous accel. / decel.
NB Left	E	E	1,590'	1,870'	Storage Provided in Design– 2400'
NB Right	Free	Free	N/A	N/A	Storage Provided in Design – 1000'
<b>East Frontage Road Intersection</b>					
EB Left	C	E	200'	350'	Storage Provided in Design– 350'
EB Thru	A	B	320'	250'	Distance to Adjacent Intersection – 550'
EB Right	A	B	240'	210'	Continuous accel. / decel.
<sup>1</sup> The queue lengths given in this table primarily come from SimTraffic with some engineering judgment. SimTraffic gives a queue length for each lane. For example, with dual left-turn lanes SimTraffic estimates a queue each lane. In the table, for thru movements the queue length is the longest queue observed in any through lane. For multiple turn lanes (i.e. dual lefts), the queue length is the sum of the queues in each lane. For a single turn lane (i.e. right turn), the queue is just the queue for that lane.					

## 2030 Package B Traffic Operations

### Interchange Configuration

The proposed interchange configuration for SH 119 in Package B is the same as in Package A (Figure 7).

Under Package B the existing car pool lot would be expanded to 456 spaces and serve as a park-and-ride lot for the bus rapid transit system.

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

Page 16 of 19

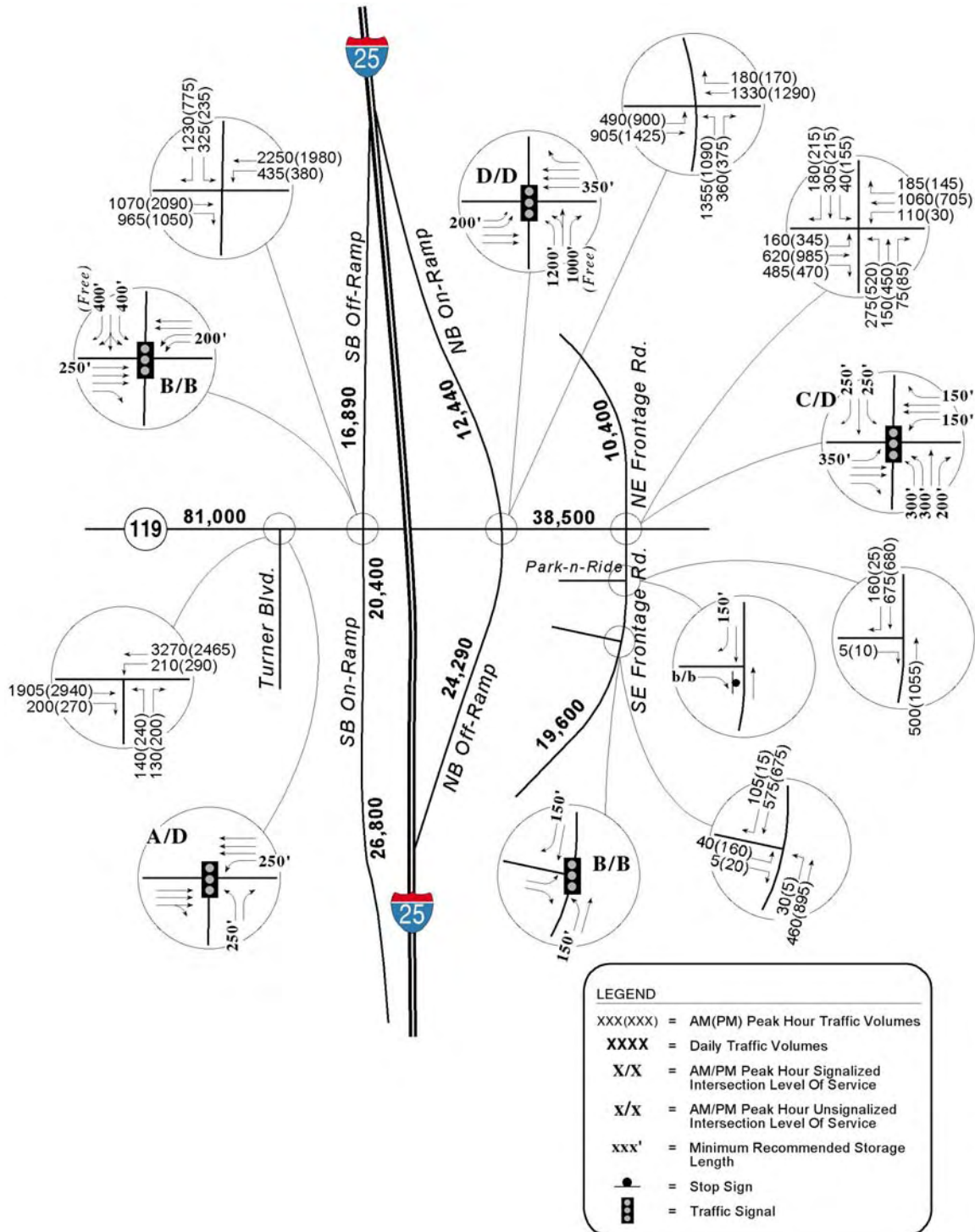
## Interchange Operations

Figure 8 also shows the levels of service for the ramps and frontage road intersections, along with recommendations for laneage at each location. As shown, all four intersections would operate at LOS D or better with the forecasted traffic volumes and the enhancements identified. The increased vehicular activity at the park-and-ride lot due to the bus rapid transit system results in the need to signalize the park-and-ride access on the east frontage road. As a signalized intersection, the park-and-ride access would operate at LOS B during both peak hours.

Table 6 summarizes levels of service for key individual turning movements at all intersections. As shown, most movements operate LOS D or better conditions in the peak hours. The left-turn movements from both off-ramps and the eastbound left-turn movement at the northbound ramp terminal operate at a LOS E. Also, the eastbound left-turn movement at the east frontage road intersection and the westbound left-turn movement at the Turner Boulevard intersection both operate at LOS E in the PM peak hour.

Table 6 also compares SimTraffic estimates of the 95<sup>th</sup> percentile queue length for those key movements to the storage distance available for each. For turning movements, the distance listed is the planned turn lane storage length, while for through movements the length listed is the distance between intersections. In most cases, the queuing analysis shows that in both peak hours the estimated 95<sup>th</sup> percentile queues would be contained within the turn bays or within the space between adjacent intersections.

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation



**Figure 8. Package B Forecasts and Levels of Service**

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

**Table 6. 2030 Package B Level of Service and Queue Lengths for Key Movements**

Intersection / Movement	Level of Service		Estimated 95 <sup>th</sup> Percentile Queue <sup>1</sup>		Intersection Spacing and Storage Length Provisions
	AM	PM	AM	PM	
<b>Turner Boulevard Intersection</b>					
WB Left	D	E	140'	230'	Storage Provided in Design – 250'
WB Thru	A	A	180'	270'	Distance to Adjacent Intersection – 350'
<b>Southbound Ramp Terminal</b>					
EB Thru	A	A	240'	190'	Distance to Adjacent Intersection – 350'
EB Right	A	A	180'	180'	Continuous accel. / decel. lane
WB Left	D	D	670'	610'	Storage Provided in Design – 1070'
WB Thru	A	B	120'	510'	Distance to Adjacent Intersection – 530'
SB Left	E	E	440'	460'	Current Storage Provided – 800'
SB Right	A	A	0'	0'	Current Storage Provided – 400'
<b>Northbound Ramp Terminal</b>					
EB Left	E	E	710'	800'	Current Storage Provided – 920'
EB Thru	B	A	250'	210'	Distance to Adjacent Intersection – 530'
WB Thru	D	D	530'	460'	Distance to Adjacent Intersection – 550'
WB Right	B	D	110'	100'	Continuous accel. / decel.
NB Left	E	E	1,280'	1,430'	Storage Provided in Design– 2400'
NB Right	Free	Free	500'	610'	Storage Provided in Design– 1000'
<b>East Frontage Road Intersection</b>					
EB Left	D	E	220'	320'	Storage Provided in Design– 350'
EB Thru	B	B	280'	370'	Distance to Adjacent Intersection – 550'
EB Right	B	A	300'	250'	Continuous accel. / decel.
<sup>1</sup> The queue lengths given in this table primarily come from SimTraffic with some engineering judgment. SimTraffic gives a queue length for each lane. For example, with dual left-turn lanes SimTraffic estimates a queue each lane. In the table, for thru movements the queue length is the longest queue observed in any through lane. For multiple turn lanes (i.e. dual lefts), the queue length is the sum of the queues in each lane. For a single turn lane (i.e. right turn), the queue is just the queue for that lane.					

## Alternatives Evaluation Comparison

### Traffic Operational Analysis

Table 7 compares the levels of service and delay at the SH 119 interchange for the three packages. As the table indicates, both Package A and Package B provide a noticeable improvement in intersection operations over the No Action Alternative. Package A provides slightly better operations at the northbound ramp terminal while at all other intersections the delay is generally the same between Packages A and B.

# SH 119 (Firestone Boulevard) at I-25 DEIS Interchange Evaluation

**Table 7. Intersection Level of Service and Delay**

Intersection	No Action		Package A		Package B	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Turner Boulevard	LOS B (11 sec.)	LOS F (>80 sec.)	LOS A (8 sec.)	LOS D (39 sec.)	LOS A (9 sec.)	LOS D (45 sec.)
Southbound Ramps	LOS C (22 sec.)	LOS B (10 sec.)	LOS B (13 sec.)	LOS B (14 sec.)	LOS B (13 sec.)	LOS B (14 sec.)
Northbound Ramps	LOS F (>80 sec.)	LOS F (>80 sec.)	LOS D (37 sec.)	LOS D (36 sec.)	LOS D (42 sec.)	LOS D (43 sec.)
East Frontage Road	LOS E (74 sec.)	LOS F (>80 sec.)	LOS C (25 sec.)	LOS D (36 sec.)	LOS C (29 sec.)	LOS D (36 sec.)

LOS X – Level of service

## - Average delay in seconds per vehicle

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